

the upper side of La Canada, by the reflection of the light, seemed lifted up about six thousand feet, occupying the topmost height of the mountains. The ranch of Colonel T. S. Hall was most conspicuously exalted. His eucalyptus trees appeared to be in the very skies, while his neighbors along the upper mesa were also elevated to a strange, weird and fantastic height. The spectacle continued for nearly two hours, when it slowly faded away, and the landscape settled down again apparently about six thousand feet to its normal condition. The sight was rare, and of absorbing interest to all who beheld it. It is not often that the refraction of light is so intense in its manifestation as in this case, and the occasion is deserving of more than a passing notice. In a horizontal distance of two and one half miles, there was a manifested elevation of more than a mile. To one familiar with the features of the country the sight was especially interesting.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-two stations show 4,828 observations to have been made, of which one was reported doubtful; of the remainder, 4,827, there were 4,317, or 89.4 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for November, 1884:

| Date— Nov., 1884. | No. of new | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total No. visible. | | Remarks. |
|----------------------|------------|-------|--------------------------------------|-------|-------------------------------------|-------|-----------------------|-------|---------------------|
| | Gr'ps | Spots | Gr'ps | Spots | Gr'ps | Spots | Gr'ps | Spots | |
| 3, 2 p. m. | | | | | | | 1 | 5 | |
| 3, 4 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | |
| 5, 10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 6, 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 7, 2 p. m. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | |
| 8, 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9, 1 p. m. | 1 | 5 | 0 | 0 | 0 | 0 | 1 | 5 | |
| 9, 4 p. m. | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 6 | |
| 10, 1 p. m. | 2 | 15† | 0 | 0 | 0 | 0 | 4 | 20† | |
| 12, 4 p. m. | 3 | 5† | 1 | 2 | | | 0 | 25† | Spots mostly small. |
| 13, 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 25† | Do. |
| 14, 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 25† | Do. |
| 18, 1 p. m. | 0 | 0 | | | | | 2 | 5 | |
| 21, 11 a. m. | 2 | 30† | | | | | 3 | 35† | |
| 22, 10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 35† | |
| 24, 10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 25† | |
| 25, 9 a. m. | 2 | 5 | 0 | 5† | 1 | 2 | 5 | 25† | |
| 27, 1 p. m. | | | | | | | 2 | 20† | |
| 29, 3 p. m. | 1 | 5† | 0 | 0 | 0 | 0 | 3 | 25† | |
| 30, 10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 25† | |

Faculae were seen at the time of every observation. †Approximated.

Mr. William Dawson, at Spiceland, Henry county, Indiana, reports sun spots as follows:

| Date. | No. of groups. | No. of spots. | Remarks. |
|--------------|----------------|---------------|---------------------------|
| 1884. | | | |
| November 6 | 1 | 1 | Near west edge. |
| 7 | 1 | 1 | 1' from west edge. |
| 8 | 0 | 0 | |
| 9—9 a. m. | 2 | 10 | Nine spots near centre. |
| 9—2.30 p. m. | 3 | 25 | Spots increasing rapidly. |
| 10 | 4 | 33 | |
| 11 | 7 | 47 | |
| 12 | 6 | 40 | |
| 13 | 7 | 43 | |
| 14 | 5 | 50 | |
| 15 | 6 | 28 | |
| 16 | 6 | 10 | |
| 19 | 3 | 28 | |
| 21 | 4 | 61 | Five spots quite large. |

NOTE.—Telescope, 4.6 inches aperture; power, 100; prism eyepiece; full aperture used.

SUN GLOWS.

The following communication referring to the first appearance of these phenomena in November, 1883, has been received from Mr. Willard D. Johnson of the United States Geological Survey:

WASHINGTON, D. C., December 9, 1884.

Prof. CLEVELAND ABBE, U. S. Signal Service, Washington, D. C.

DEAR SIR: The phenomena of the red skies first attracted my attention

on November 24, 1883, near Mono Lake, California. A heavy wind had been blowing across the Sierras from the west since the previous evening; as the air was apparently clear the day seemed unaccountably gray and the fiery sunset, and widespread, persistent after-glow excited comment in my party as a remarkable and impressive exhibition. Sunrise on the following morning was preceded by a yet deeper and higher-reaching color in which a shade of green was prominent. The appearance of this sky was peculiarly unnatural, my cook describing it as "sickly," and declaring that it destroyed his appetite. During the day, although the sky remained cloudless, the sun's light was very sensibly diminished; its disk variously tinted with alternating shades of red, yellow and green, and its outline traceable to the naked eye.

For a week at least, the striking exhibitions showed no abatement. When we finally learned that they were not of local occurrence, and were of general interest, we could not remember that we had observed any unusual appearance of the skies previous to the above date.

Very respectfully,

WILLARD D. JOHNSON.

The sun glows were as extensively observed during November, 1884, as in the preceding months, being reported generally from all parts of the country. The displays equalled in brilliancy those heretofore observed, and in some instances are said to have surpassed those of last year.

Mr. C. Beecher, voluntary observer at Newport, Florida, reported: "on the 18th and 25th a brilliant red sky before sunrise—more splendid than anything last year—it seemed as though an immense conflagration were raging. It extended half way around the horizon and was reflected on the opposite side."

DROUGHT.

Alabama.—Professor P. H. Mell, jr., director of the Alabama State Weather Service, reports the following:

The autumn of 1884 was remarkable for the longest and most severe drought ever recorded by the meteorologists of the state. Beginning immediately after the violent rains of the last week in July, it continued through August, September, October and November, broken only by a few showers. The drought was aggravated by the unusually high temperature of September and the first week of October. This combination of heat and drought reduced the streams, wells and springs, and reports of the dearth of water came from all quarters of the state, except along the coast, where the precipitation was nearly normal. In many sections cattle were fed as in the winter; pastures and all late crops were much injured; the sowing of grain was greatly retarded; the amount of cotton made was reduced, but most of the crop was gathered before any rain fell upon it, and it is in excellent condition for the market.

Florida.—Cedar Keys, 3d: the weather continues very dry; cisterns exhausted and water for drinking and household purposes very scarce; 13th, drought still continues.

New Hampshire.—The "New York Herald" of November 20th published the following:

CONTOOCOOK, November 19.—The effects of the drought are seriously felt in many portions of this state. In some localities sickness, due wholly or in part to the use of water from low wells, has occurred and seems to be increasing.

The following is from the "New York Journal of Commerce," of November 24th:

NASHUA, November 22.—The drought has become a very serious matter in this vicinity and is a cause of general alarm in its consequences upon the health of the people. In many of the suburban towns wells and springs have given out, farmers have to drive their live-stock long distances for water, and are also greatly troubled in obtaining water for household purposes. In this city the sewerage is affected, and the scarlet fever, from which there has been a great many deaths, is raging to such an extent that at a meeting of the Board of Education last night it was voted to close the public schools.

New Jersey.—Vineland, Cumberland county, 30th: the weather continued very dry during the month; wells very low.

North Carolina.—Kelley's (near Raleigh), 30th: the severest drought that has been experienced for many years prevailed from September 11th to November 19th; the streams and wells became nearly dry.

Tennessee.—Nashville, 26th: drought prevails throughout the state; since the 1st only 0.88 inch of rain has fallen.

Virginia.—Wytheville: the long continued drought was ended by the rains of the 23d.

The following extracts are from the "New York Herald" of November 17th and 20th, respectively:

PETERSBURG, November 16, 1884.—The drought of the past few months remains unbroken. In some of the upper counties springs and streams are still drying up. The drought is a great drawback to farmers, who, in consequence of the dry and hard condition of the ground, are unable to plough their lands. For more than a month the water in the city reservoirs has been so low, that only one-half of the citizens have been supplied from that source, the other half being furnished from the river.

LYNCHBURG, VA., November 19, 1884.—A tale of deep distress comes from Buchanan, Wise and Dickenson counties. These counties occupy isolated positions on the extreme western limit of Virginia. For a number of weeks a fatal disease has been prevalent there, and many deaths have occurred. The nature of the disease is as yet undefined, but it is believed to arise from poisonous water. A drought that has continued there for months has nearly dried up all the streams, springs and wells, and it is supposed that the water left is impregnated with mineral poisons. A reliable correspondent writing from there, tells a pitiful story, and says that in some cases as many as four corpses were found in a single house.

West Virginia.—Charleston, 21st: reports from the extreme southwestern counties of Virginia and the adjoining counties in Kentucky, state that no rains of consequence have fallen in that region for four months, which resulted in an almost entire failure of crops, and an insufficient water supply. In some localities inconvenience from this cause was experienced as early as the middle of August. The continued scarcity of water compelled the inhabitants to use, for drinking, the water in the beds of creeks. The use of this impure water is supposed to have caused a peculiar and fatal disease. It is reported that in some instances, especially along McLean Creek, entire families perished. The drying up of the streams also caused the suspension of work in all the mills that were dependent on water power.

EARTHQUAKES.

November 4th.—Ship "Occidental," at San Francisco, November 14th, from Nanaimo, reported that at 6 p. m. on November 4th, one hundred and fifty miles off Mendocino, she experienced three shocks of earthquake, and, a few hours later, two heavier shocks were felt.

6th.—The "New York Herald," of November 8th, has the following:

BUENAVENTURA, via. GALVESTON, November 7, 1884.—News from Cali and other towns in the southern states of Colombia, reports that the most severe shock of earthquake that has been experienced for three years was felt last night. The church of the San Pedro, at Cali, was wrecked and another church and several houses suffered severely. The other towns which felt the shock escaped without serious injury.

9th.—Fort Bridger, Wyoming: at about 2.00 a. m. of this date, an earthquake shock was felt at this station, causing windows to shake and alarming the garrison. The Signal Service observer reported: "Telegraph poles shook and the wires swung perceptibly; the shock lasted from five to ten seconds, and, as nearly as I can estimate, moved from west to east."

10th.—The "Kansas City Review of Science" publishes the following: "A severe shock of earthquake was felt at Salt Lake City, Utah, at about two o'clock on the morning of the 10th. Much alarm was felt but no damage was done. The tremors lasted about ten seconds. At Paris, Idaho, six shocks were felt about the same time, and from then till four o'clock. Considerable damage to houses is reported and the people were affected as by sea-sickness. The shocks were from northeast to southwest, then a swaying motion from north to south; the succeeding shocks were from east to west."

12th.—Professor C. G. Rockwood, jr., of Princeton, New Jersey, reports: "About 7.50 p. m. a slight earthquake occurred in southern New Hampshire, reported from Concord, Hopkinton, Bradford, and Warner, in Merrimac county and Hillsborough, in Hillsborough county."

13th.—An earthquake shock was felt in Colchester and Kingsville, in Essex county, Ontario, at about 10 a. m. At the latter place, the glass in a few windows was broken.

21st.—Several places, both on the north and south shores of the river Saint Lawrence, extending from Saint Flavie

to Gaspé, a distance of one hundred and fifty miles, were visited by a shock of earthquake during the evening. The shock lasted in some places for fifty seconds, and although not heavy enough to do any serious damage, greatly alarmed the settlers along its track.

22d.—The "New York Herald," of November 23d, publishes the following:

LIMA, via GALVESTON, November 22, 1884.—A strong shock of earthquake was felt here at thirteen minutes past seven o'clock this morning. Its motion was from southwest to northeast. There was no unusual electric disturbance. Clouds of dust were visible from three to five miles from Callao, where portions of the cliff were shaken down on the beach. The walls of many houses were cracked and some were shaken down. In Chorillos there is a series of cracks nine yards from the edge of the cliff.

23d.—The "New York Herald," of November 24th, contains the following:

CONCORD, N. H., November 23, 1884.—A slight shock of earthquake was felt here at half-past twelve this morning, followed sixteen minutes later by a very heavy one, lasting several seconds, during which large buildings were shaken. The second shock was accompanied by a heavy rumbling noise, which was sufficiently loud to awaken people from their slumbers. The shocks were also felt in various parts of the state.

CONTOOCOOK, November 24, 1884.—A shock of earthquake was felt at Henniker yesterday morning, so severe as to displace the foundation of the boiler in Gage's manufactory. The shock was extensively felt in this part of New Hampshire.

BOSTON, Mass., November 24, 1884.—The earthquake shock reported from various points in New Hampshire as having occurred early yesterday morning was felt in this vicinity also. A gentleman living in Cliftondale states that he noticed it very perceptibly, and noted the time, which was forty minutes past twelve a. m.

NEW IPSWICH, N. H., November 24, 1884.—An earthquake shock was distinctly felt here yesterday morning by many persons.

WORCESTER, Mass., November 24, 1884.—The earthquake shock yesterday morning was plainly felt in Holden, six miles north of here.

The following is a synopsis of the information collected by Sergeant D. F. Flannery, Signal Service Observer at Memphis, Tennessee, concerning the earthquake shock felt in that city on the night of the 29th:

| Names. | Buildings. | Time. | Waves. | Direction. | By whom felt. | Effects. |
|--|--|-------------|---|------------|---|---|
| W. S. Anderson | Four story, substantial brick, 223 2d street. | Not given | Two: 1st, severe; duration, instant; interval, two seconds. 2d wave lighter than the first one. | w. to e. | Writer | Interrupted his writing; motion like small boat on water. |
| R. W. Tucker | Frame, 2 to 5 feet on pillars above ground, 2A Broadway. | 10.55 p. m. | One severe shock, lasting several seconds. | w. to e. | Mrs. R. W. Tucker and Miss Florence Tucker. | Furniture creaked. |
| Mrs. M. E. Carter | Frame, 3 feet above ground, 302 Lauderdale street. | 11.00 p. m. | Two shocks, duration, 10 to 12 seconds, swinging motion. | w. to e. | Writer | Bed, windows, and house shook |
| Dr. De Benaucency | Two story, clay foundation, 181 Maine st. | 11.15 p. m. | One shock, duration, 10 seconds. | | Writer | House rocked |
| A. L. Cummins | Two story brick, 55 Poplar st. | 11.02 p. m. | One severe shock, with heavy rumbling noise, duration, 30 to 40 seconds. | ne. to sw. | Writer | House rocked |
| Col. Edginton | Two story brick, 122 Jones Avenue. | 11.00 p. m. | One severe shock, lasted 3 to 4 seconds. | sw. to ne. | Writer | House and bed shook. |
| Article "Appeal," signed J. M. H. | | 11.03 p. m. | A noise like wind preceded the wave; lasted 60 seconds. | s. to n. | Writer | Windows rattled; chairs swayed. |

Hartford, Connecticut: at 12.30 a. m. on the 23d, a perceptible tremor was felt by the employees in the top story of the "Courant" building. As a strong wind was blowing at that time the motion was attributed to that, until reports from other points stated that an earthquake had occurred. At

Mansfield, forty miles distant, several very distant shocks were felt at about 12.45 a. m. There were seven or eight shocks which came in rapid succession, so rapidly that they were not accurately counted. The first shock appeared to have been the lightest, and the succeeding shocks increased in intensity, the last being the heaviest.

27th.—Geneva, Switzerland, several shocks of earthquake were felt here at 11 p. m.

28th.—Slight earthquake shocks were felt yesterday at Rome; at Marseilles, at Lyons, and in the department of the Maritime Alps.

29th.—The following is from the Report of the Tennessee Weather Service for November, 1884:

Mr. Louis Hughes, observer at Dyersburg, reports a slight shock of earthquake as follows: "On the 29th, at 11.5 p. m., rumbling noise southwest; vibrations medium; house trembled; did not disturb those asleep; direction of vibrations from southwest to northeast; vibrations lasted about five seconds; a feeble second shock was felt after an interval of about a minute and a half."

Dr. T. W. Roane, observer at Covington, reports that on the night of the 29th, about 10 o'clock, the shock of an earthquake (though not a very hard one) was quite easily felt and heard, lasting about a minute.

PRAIRIE AND FOREST FIRES.

Brevard, Transylvania county, North Carolina: from the 11th to the 17th the air was filled with dense smoke from forest fires; during the 15th and 16th the smoke was so dense that the sun cast no shadows.

Highlands, Macon county, North Carolina: the atmosphere was very smoky from the 11th to the 17th, being caused by forest fires.

Reports from Norfolk, Virginia, on the 11th stated that fires had broken out in the Dismal Swamp, destroying trees and telegraph poles.

Petersburg, Virginia: reports from Greenville county state that on the 19th considerable quantities of timber and fencing, and some houses were destroyed by forest fires near the town of Hicksford. In consequence of the protracted drought the grass and undergrowth were so dry as to burn easily.

Fort Maginnis, Montana: extensive forest fires prevailed in the mountains southeast of the station on the 14th and 19th.

Sherlock, Finney county, Kansas: on the morning of the 14th the prairie took fire at a point about six miles southeast of this place; the fire started at 9 a. m., at which time a strong southwest wind was blowing, which caused the flames to travel with great rapidity. The "side fires" were fought by herdsman and in some places they were extinguished but the "head fire" continued during the day and also on the 15th, travelling northward. During the latter date the wind changed to northwest and north, and the fires apparently died out. On the 16th the wind changed to east, bringing from the burnt district dense clouds of smoke, which obscured the sun and shut from view the surrounding country. At night the wind backed to northeast and the fire continued to spread westward and southward, menacing the settlements along the Arkansas river. The fires were extinguished by the snow-storm on the 17th, on which date the reports from various points showed that the fires had swept over a strip of country about seventy miles long and averaging thirty miles in width. The area burned over embraced about 1,500,000 acres, situated mainly in the counties of Hamilton, Finney, Hodgeman, and Lane. In the last-named county the damage was especially heavy.

Prairie and forest fires were also reported from the following places:

Lead Hill, Arkansas, 27th, 28th, 29th.

Allison, Kansas, in e. and sw. on the 1st.

Maud, Kansas, 3d to 7th.

Saint Vincent, Minnesota, 12th, 15th, 16th.

Fort Yates, Dakota, 6th.

Yankton, Dakota, 17th, 19th, 30th.

Fort Assinaboine, Montana, 7th.

Cantonment, Indian Territory, 19th.

Pike's Peak, Colorado, prairie fires southeast of station on the 24th.

METEORS.

Meteors were observed during the month as follows:

Arkansas.—Lead Hill, 4th.

Connecticut.—New London, 5th.

Dakota.—Webster, 23d.

Florida.—Archer, 10th.

Illinois.—Anna, 13th.

Indiana.—Vevay, 7th, 11th, 12th.

Iowa.—Davenport, 10th; Cedar Rapids, 7th, 9th, 10th, 12th.

Kansas.—Clay Center, 8th, 9th, 11th, 14th, 18th, 20th, 25th; Salina, 7th, 9th, 14th; Sherlock, 5th, 10th, 13th; at Allison meteors were observed as follows: twenty-six from 6.40 to 8.30 p. m. on the 6th; twenty-nine from 5.45 to 8.28 p. m. on the 7th; twenty-six from 6 to 8.55 p. m. on the 8th; twenty-eight from 5.55 to 8.40 p. m. on the 9th; thirty from 6.15 to 8.27 p. m. on the 10th; nineteen from 6.10 to 7.35 p. m. on the 11th; thirty-one from 6.20 to 8.55 p. m. on the 12th; twenty-five from 6.05 to 8.10 p. m. on the 13th; six from 5.50 to 7 p. m. on the 14th.

Kentucky.—Richmond, 9th, 13th.

Maryland.—Woodstock, 5th, 12th, 13th, 15th, 16th, 17th.

Massachusetts.—Somerset, 11th, 16th.

Michigan.—Thornville and Grand Haven, 15th.

Nebraska.—Yutan, 14th; Crete, 23d.

New Jersey.—Readington, 6th, 15th.

New York.—Le Roy, 9th; Menand Station (near Albany), 14th, 15th; Oswego, 14th, 15th, 16th.

North Carolina.—Kelley's (near Raleigh), 6th, 7th, 8th.

Ohio.—Hiram, 14th, 18th.

Oregon.—Albany, 14th.

Pennsylvania.—Fallsington, 15th.

Rhode Island.—Block Island, 2d.

South Carolina.—Stateburg, 8th, 24th.

Texas.—Indianola, 13th.

Utah.—Nephi, 27th.

Virginia.—Wytheville, 1st, 13th; Variety Mills, 5th, 10th, 11th, 29th; Blacksburg, 8th; Dale Enterprise, 24th.

Washington Territory.—Dayton, 7th.

Wisconsin.—Beloit, 20th, 21st; Sussex, 27th; Madison, 7th, 13th.

MIGRATION OF BIRDS.

Geese flying southward.—Fort Smith, Arkansas, 9th; Roseburg, Oregon, 11th; Bismarck, Dakota, 12th; Archer, Florida, 1st, 8th; Oœur d'Alene, Idaho, 21st; Edgington, Illinois, 8th; Indianola, Iowa, 19th; Independence, Kansas, 18th, 19th, 25th; Salina, Kansas, 11th, 12th, 13th; Allison, Kansas, 9th, 10th, 19th, 20th, 22d, 23d; Thatcher's Island, Massachusetts, 19th; Yutan, Nebraska, 4th, 29th; North Volney, New York, 3d; Palermo, New York, 13th, 14th; New River Inlet, North Carolina, 4th; Toledo, Ohio, 3d; Portland, Oregon, 7th; Point Judith, Rhode Island, 8th to 11th, 16th, 18th, 19th, 20th; Memphis, Tennessee, 6th, 23d; Fort Myer, Virginia, 3d, 5th; Cape Henry, Virginia, 4th; Embarras, Wisconsin, 1st.

Ducks flying southward.—Indianola, Iowa, 12th; Allison, Kansas, 22d; Yutan, Nebraska, 1st, 26th; Kitty Hawk, North Carolina, 3d; Memphis, Tennessee, 3d; Cape Henry, Virginia, 4th; Fort Myer, Virginia, 28th.

Cranes flying southward.—Indianola, Iowa, 14th, 16th.

POLAR BANDS.

Lead Hill, Arkansas, 9th, 13th, 16th.

Archer, Florida, 2d, 3d, 5th, 6th, 13th, 14th, 21st, 24th, 29th, Riley, Illinois, 17th.

Laconia, Indiana, 27th.

Guttenberg, Iowa, 8th, 13th, 15th.

Yates Centre, Kansas, 25th.

Salina, Kansas, 7th.

Maud, Kansas, 24th.

Point Pleasant, Louisiana, 23d.

Gardiner, Maine, 1st, 30th.

Yutan, Nebraska, 2d.